
CHAPTER 10 UTILITY AND BOTTLED GAS FOR HAWAII

10.1 Gas Use in Hawaii

Because Hawaii does not have access to natural gas, other forms of petroleum-based gas met 2% of Hawaii's energy needs in 1997. Table 10.1 shows the percentage contribution of liquefied petroleum gas (LPG) and synthetic natural gas (SNG) to Hawaii's total energy use, by county, in 1997.

| Table 10.1 Gas Contribution to Hawaii Total Energy Use, 1997 | | | | | |
|--|------------|-------------|------------|------------|-------------|
| | Hawaii | Honolulu | Kauai | Maui | Statewide |
| Million Btu Used | | | | | |
| Utility SNG | none | 2,900,675 | none | none | 2,900,675 |
| Utility LPG | 205,811 | 176,265 | 9,176 | 72,221 | 463,473 |
| Non-Utility LPG | 615,194 | 1,077,973 | 330,121 | 840,272 | 2,863,560 |
| LPG Subtotal | 821,005 | 1,254,239 | 339,297 | 912,493 | 3,327,033 |
| Gas Subtotal | 821,005 | 4,154,914 | 339,297 | 912,493 | 6,227,708 |
| Total Energy | 25,061,040 | 245,979,147 | 10,858,201 | 28,873,709 | 313,972,097 |
| Percentage of Total Energy Used | | | | | |
| Utility SNG | none | 1.2% | none | none | 0.9% |
| Utility LPG | 0.8% | 0.1% | 0.1% | 0.3% | 0.1% |
| Non-Utility LPG | 2.5% | 0.4% | 3.0% | 2.9% | 0.9% |
| Total LPG | 3.3% | 0.5% | 3.1% | 3.2% | 1.1% |
| Total Gas | 3.3% | 1.7% | 3.1% | 3.2% | 2.0% |

Source: DBEDT 1999; TGC 1998 a through e, 19

Gas is piped to customers through utility systems owned by The Gas Company (TGC), a division of Citizens Energy Services. For the southern portion of Honolulu, SNG is produced from refinery feedstock and provided to TGC customers via pipelines. In other areas of Oahu and on the neighbor islands, propane is stored in tanks and piped to customers through utility pipelines. LPG is also used in the form of bottled, non-utility gas on all islands.

The remaining sections of this chapter examine the utility gas system in more detail, including non-utility gas use, an estimate of future demand, and environmental and economic aspects of gas use in Hawaii.

10.2 Hawaii's Utility Gas Systems

10.2.1 Utility Gas Supply

TGC is a utility regulated by the Hawaii PUC. TGC provides SNG and propane to its customers through pipelines.

10.2.1.1 Synthetic Natural Gas for Oahu

TGC manufactures SNG at its plant in the Campbell Industrial Park on Oahu to supply the utility gas network serving the southern portion of Oahu. The SNG is manufactured from a low-octane hydrocarbon (or "light ends") feedstock provided under contract through a pipeline from the Tesoro Hawaii refinery. The feedstock price is tied to international prices for crude oil. The SNG plant has a maximum output of about 150,000 therms (15 billion Btu) a day (TGC 1999, 4-1 to 4-2). This

capacity was well within demand forecast through 2020 in TGC's second Integrated Resource Plan (IRP) (2-17). TGC also has a backup propane-air unit to add a propane air mixture to the SNG utility pipeline on Oahu in event of an emergency (TGC 1999, 4-2).

10.2.1.2 Propane Utility Gas for Rural Oahu and the Neighbor Islands

The areas outside the SNG grid on Oahu, and the islands of Hawaii, Kauai, Maui, and Molokai, are served with propane. The propane is stored in tanks and sent to customers through distribution pipeline networks. There are 30 propane systems on Oahu, 4 on Hawaii, 5 on Kauai, 4 on Maui, and 2 on Molokai (A-3). The propane is usually purchased from Oahu refiners, although propane is occasionally imported directly. TGC owns two barges used to ship propane from Oahu to the neighbor islands, except Molokai, which is provided propane in ISO-container tanks shipped by container barge (4-2).

10.2.2 Utility Gas Demand

In 1997, hotels, restaurants, and other commercial and industrial customers accounted for 71% of utility gas use, as shown in Figure 10.1. Principal end uses are water heating, cooking, and clothes drying (TGC 1999, 2-15). Table 10.2 lists the numbers of utility gas customers in 1997 by rate classification and island and provides statewide totals. Table 10.3 shows 1997 utility gas use by customer rate classification and island.

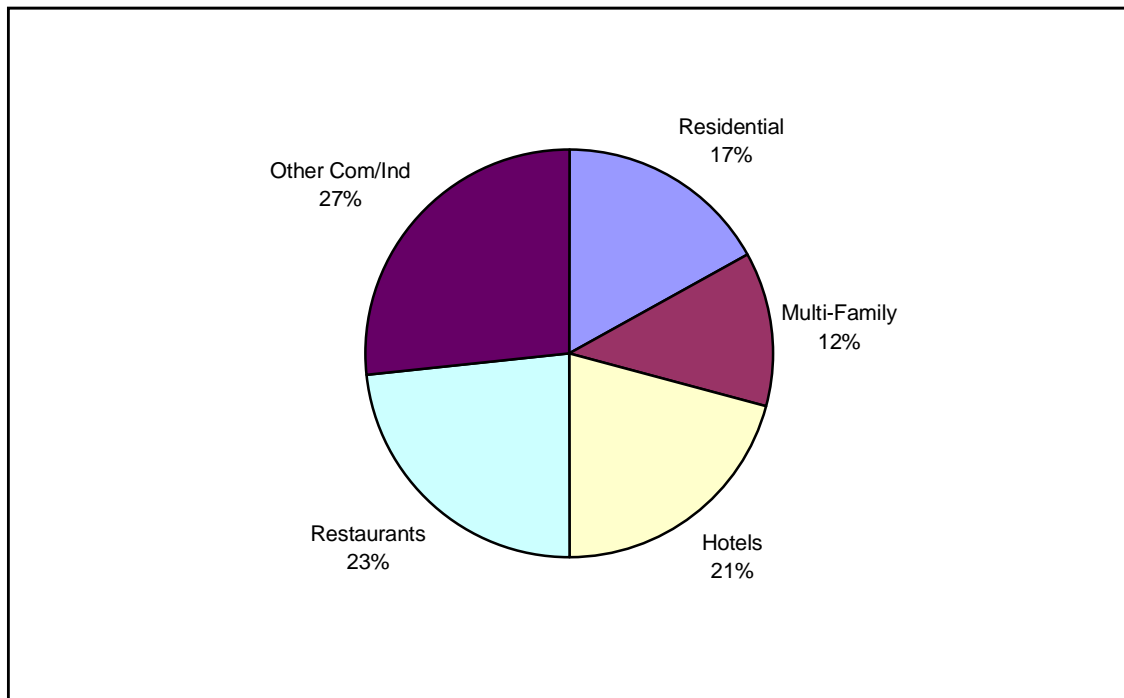


Figure 10.1 Percentage of Utility Gas Use by Customer Category, 1997

| Table 10.2 Utility Gas Customers by Rate Classification and Island, 1997 | | | | | | |
|---|---------------|-----------------|--------------|-------------|----------------|------------------|
| Rate Classification | Hawaii | Honolulu | Kauai | Maui | Molokai | Statewide |
| Residential | 1350 | 30,513 | 584 | 325 | 103 | 32,875 |
| Residential (Employee) | 2 | 61 | | 1 | | 64 |
| Large Firm | | 72 | | | | 72 |
| Standby | | 14 | | | | 14 |
| General Service | 83 | 882 | | 4 | | 969 |
| Multi-Unit Housing | 41 | 416 | | 6 | | 463 |
| Comm & Industrial | 175 | 1,787 | | 56 | | 2,018 |
| Large Industry | 7 | 2 | | 1 | | 10 |
| Alternate Energy | | 1 | | | | 1 |
| Interruptible Svc - Oil | | 15 | | | | 15 |
| Interruptible Svc - Propane | | 9 | | | | 9 |
| Standby | | 28 | | | | 28 |
| Total Customers | 1,658 | 33,800 | 584 | 393 | 103 | 36,538 |

Source: TGC 1998a through e, 40

| Table 10.3 Utility Gas Sales by Rate Classification and Island (Million Btu), 1997 | | | | | | |
|---|----------------|------------------|--------------|---------------|----------------|------------------|
| Rate Classification | Hawaii | Honolulu | Kauai | Maui | Molokai | Statewide |
| Residential | 25,023 | 516,522 | 8,562 | 7,026 | 2,007 | 559,141 |
| Residential (Employee) | 22 | 1,100 | 3 | 20 | - | 1,145 |
| Large Firm | - | 743,337 | - | - | - | 743,337 |
| Standby | - | 362 | - | - | - | 362 |
| General Service | 1,909 | 34,127 | - | 127 | - | 36,163 |
| Multi-Unit Housing | 31,604 | 203,982 | - | 3,898 | - | 239,485 |
| Comm & Industrial | 107,013 | 1,075,445 | - | 41,578 | - | 1,224,035 |
| Large Industry | 66,349 | 70,862 | - | 19,329 | - | 156,540 |
| Alternate Energy | - | 925 | - | - | - | 925 |
| Interruptible Svc - Oil | - | 240,729 | - | - | - | 240,729 |
| Interruptible Svc - Propane | - | 88,911 | - | - | - | 88,911 |
| Standby | - | 7,262 | - | - | - | 7,262 |
| Million Btu Sold | 231,921 | 2,983,563 | 8,566 | 71,978 | 2,007 | 3,298,034 |
| Percent of Statewide Total | 0.7% | 9.0% | 0.0% | 0.2% | 0.0% | 10% |

Source: TGC 1998a through e, 40

10.3 Non-Utility Gas

For customers not on utility pipelines, an option for water heating, cooking, drying, and other gas uses is non-utility gas. Propane is distributed by tank truck to tanks on customer premises by TGC, Oahu-Maui Gas, and Aloha Gas. In addition, a number of vehicles are fueled with propane, usually at fleet bases or at some gasoline stations. As noted above, in 1997 the use of non-utility gas in 1997 was 2.86 TBtu

10.4 Future Demand for Gas

Figure 10.2 shows TGC forecasts of statewide utility gas demand in Hawaii for the years 2000 to 2020. Three forecasts were developed as part of their 1999 IRP: TGC High Case, TGC Base Case, and TGC Low Case. Based upon these estimates, utility gas demand in 2020 was estimated to range between 3.06 and 3.94 TBtu.

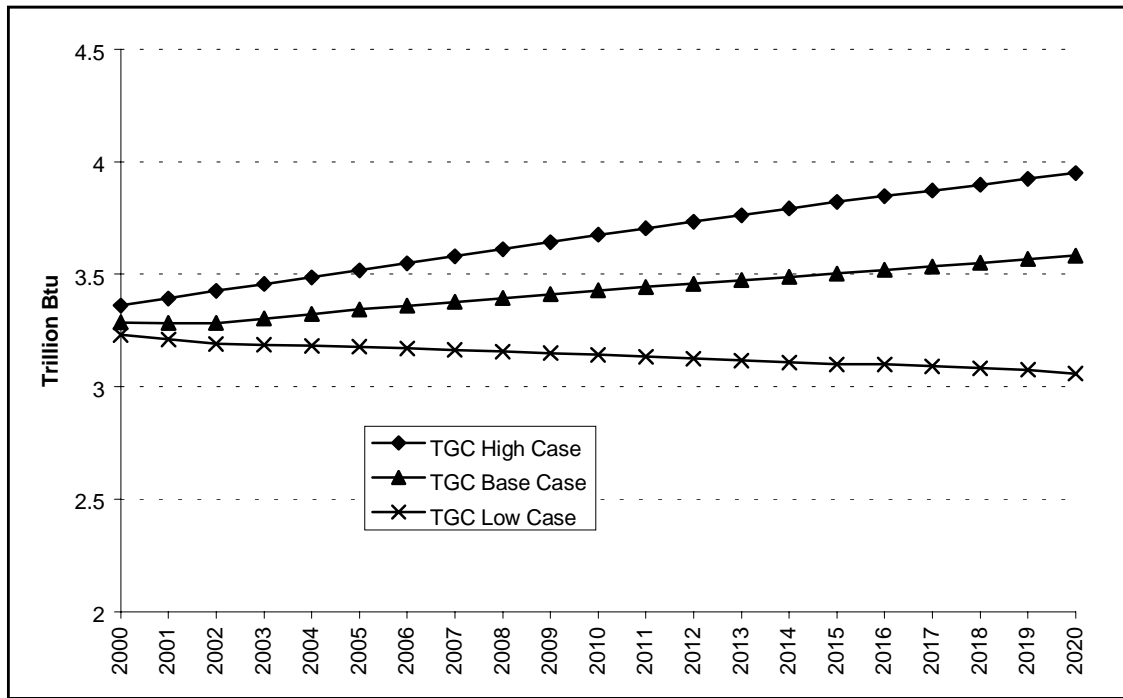


Figure 10.2 TGC Forecasts of Statewide Utility Gas Demand, 2000–2020

10.5 The Gas Company’s Integrated Resource Plan

The Gas Company filed its second IRP with the PUC in March 1999. The IRP was the result of a comprehensive planning process that reviewed and analyzed TGC’s options for supplying energy to its customers. TGC’s IRP process included setting objectives, forecasting gas energy and peak demand, assessing DSM options, and preparing a list of candidate plans for supplying gas from the year 2000 to 2020. The relative costs of the plans were considered, external costs and benefits were considered, and a preferred IRP and contingency IRP were selected (TGC 1999, iii–iv).

The major supply-side elements of the TGC IRP were to continue to operate in the current manner, with modest major equipment and maintenance investments at the SNG plant. The contract for feedstock from the Tesoro Hawaii refinery was to be continued. Propane purchases were to be continued from on-island refiners, but options for imports, including imports in larger quantities, were to be explored. Distribution to Neighbor Islands was to continue, using current practices (7-2).

TGC also planned to continue its current program of upgrading distribution and service lines for about 8 to 10 years, and pending the results of structural testing, the company may replace its existing propane barges (7-2).

The plan did not propose DSM programs, but modest “DSM support activities” were estimated to save 630,000 therms. The activities included:

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- Residential and small commercial customer-targeted water heating information on the benefits of replacing failed water heaters with high efficiency units and the benefits of low-cost water saving methods;
 - Demonstration of high efficiency commercial cooking techniques, including installation of equipment on hosting premises;
 - Audits of energy use and energy savings opportunities for large-volume commercial customers; and
 - Activities to track cost and gas savings (7-1 to 7-2).

TGC considered a number of potential DSM plans, but instead decided to propose the support activities. The principal reason was that TGC has ample supply capacity for the entire IRP period. Any savings in gas use would not delay or prevent any capacity additions, as none are planned. As a result, TGC was also concerned that DSM programs would increase rates as customers paid for lost margins and because fixed costs would not be avoided. Finally, TGC was concerned that higher rates would reduce its competitiveness (3-23)

10.6 External Costs and Benefits

TGC's IRP defined "externalities" as "those impacts (or benefits) of an activity that are generally not reflected in the 'internal' or direct market costs of an activity" (5-1). Overall categories of externalities considered by TGC in its IRP included environmental, macroeconomic and employment, energy security, and social and cultural. TGC sought to prioritize externalities according to the impact the externality was likely to have on development of a preferred resource plan. Their objective was to determine the monetary value ("to monetize") the significant external costs and benefits.

TGC divided all externalities into three categories, in order of priority. These were:

- Greenhouse gases (CO₂, CH₄, and N₂O, etc.) that contribute to climate change;
- Criteria air pollutants as defined by the Clean Air Act (CO, NO_x, SO₂, PM, ozone, and lead);
- All other externalities resulting from gas production, transportation, and use (5-2).

TGC's quantification of the costs of these externalities was presented in Section 2.3.2. TGC planned a number of actions intended to help minimize emissions in the future. These actions include maintenance and replacement of transmission and distribution pipelines to minimize leaks and structural integrity testing of components of the SNG plant, propane barges, propane storage tanks, and other equipment (8-6).

10.7 Recommendations for Hawaii's Gas Sector

10.7.1 ***RECOMMENDATION: Encourage Cost-Effective Renewable Energy Substitution for Gas***

Suggested Lead Organizations: The Gas Company, Renewable Energy Suppliers, and DBEDT

As part of TGC's IRP, potential substitution for SNG and propane was examined. TGC believes that after 2020, biogas and hydrogen offer some potential (4-16). In addition, solar water heating now offers a substitute for the gas water heating end use. While TGC did not select solar water heating as a DSM program, it is an obvious potential renewable energy replacement for one end use of utility and non-utility gas and electricity.

10.7.2 ***RECOMMENDATION: Encourage Use of Gas as a Fuel for Distributed Electricity Generation and Fuel Cells, Where Cost-Effective and Energy-Efficient***

Suggested Lead Organizations: DBEDT, The Gas Company, and Distributed Generation Suppliers

Pipeline utility or non-utility gas could provide fuel for future distributed electricity generation or cogeneration at end-user facilities. In addition, it could be used to power fuel cells. These options deserve further study and analysis. Such uses could enhance the efficiency of Hawaii's gas and electricity systems.

10.7.3 ***RECOMMENDATION: Utility Integrated Resource Planning Should Consider Cost-Effective, Energy-Efficient Fuel Substitution between Electricity and Gas***

Suggested Lead Organizations: Public Utilities Commission, Electric Utilities, The Gas Company

It is recommended that the IRP Framework be revised to require electricity and gas utilities to consider which fuel, electricity or gas, meets end-use energy needs most cost-effectively and with the greatest energy efficiency.